Quarterly Report 11 – Public Page

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Project Title:	Achieving Maximum Crack Remediation Effect from Optimized Hydrotesting

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Background

Hydrotesting is one of the key techniques widely adopted for pipeline integrity management. A dilemma is created when hydrotesting is performed on pipelines experiencing stress corrosion cracking: hydrotesting eliminates defects of critical size and conditions sub-critical cracks to achieve a post-test period without operating failure; adversely it shortens remaining life because of crack growth during hydrotesting even for small SCC cracks according to the latest research findings. This project is aimed to determine how effective hydrotesting is toward crack remediation. Specifically, efforts will be made to establish a working model that will allow the industry to predict the overall benefits of hydrotesting. When hydrotesting is necessary, the model will help pipeline operators select the hydrotesting parameters that would generate the most effective crack remediation.

Progress in the Quarter

Project activities undertaken through the 11th quarter focused on completing the software used for the prediction of crack growth based on SCADA data provided by pipeline operators and validating the predictions using historical crack data collected from the field.

In the previous reporting period, efforts were made in defining hydrostatic loading conditions that would generate the most effective crack remediation. We found that zero crack growth can be achieved when the hydrostatic loading was performed at low loading rate allowing a full occurrence of low temperature creep at the crack tip. In this period, additional tests were performed to understand the effect of low temperature creep on crack growth. Based on the results obtained, it is concluded that there exists a critical loading rate at which the largest crack growth can occur during hydrostatic loading. The amount of crack growth is controlled by room temperature creep when the loading rate is lower than the critical loading rate, while crack growth is controlled by the hydrogen mechanisms when the loading rate is higher than the critical loading rate. At end of this reporting period, we were finally able to debug the crack growth prediction software to make the first prediction using SCADA data. The predicted crack

growth is so far roughly consistent with the field observations. Currently we are conducting sensitivity studies of the predictions using the software.

Plans for Future Activity

- To further validate the predictive software being developed and to prepare the final report .
- To report the results to supporting companies toward the end of April 2011.